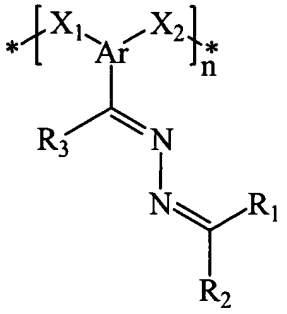
CLAIMS

What is claimed is:

1. An organophotoreceptor comprising an electrically conductive substrate and a photoconductive element on the electrically conductive substrate, the photoconductive element comprising:

(a) a charge transport material comprising a polymer having the formula:



where X_1 and X_2 are, each independently, a linking group;

Ar comprises an aromatic group;

R_1, R_2, and R_3 comprise, each independently, H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group; and

n is a distribution of integers between 1 and 100,000 with an average value of greater than one; and

(b) a charge generating compound.

2. An organophotoreceptor according to claim 1 wherein R_1 and R_2 comprise, each independently, an [(N,N-disubstituted)amino]aryl group.

3. An organophotoreceptor according to claim 1 wherein X_1 and X_2, each independently, comprise a $-(CH_2)_m-$ group, where m is an integer between 1 and 20, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a, R_b, R_c, R_d, R_e, and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino

group, an alkyl group, an alkoxy group, an alkenyl group, an alkynyl group, a heterocyclic group, an aromatic group, or a part of a ring group.

4. An organophotoreceptor according to claim 3 wherein X_1 is a $-Y_4-CH_2-$ group, and X_2 is a $-Y_5-CH_2CH(Y_6H)CH_2-Y_1-Z_1-Y_2-Z_2-Y_3-CH_2CH(Y_7H)-$ group where Y_1, Y_2, Y_3, Y_4, Y_5, Y_6, and Y_7 are, each independently, O, S, or NR where R is H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group; and Z_1 and Z_2, are, each independently, an aromatic group.

5. An organophotoreceptor according to claim 4 wherein Y_1, Y_2, and Y_3 are, each independently, S; and Z_1 and Z_2, are, each independently, a phenylene group.

6. An organophotoreceptor according to claim 1 wherein the photoconductive element further comprises a second charge transport material.

7. An organophotoreceptor according to claim 6 wherein the second charge transport material comprises an electron transport compound.

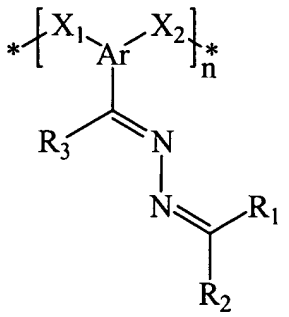
8. An organophotoreceptor according to claim 1 wherein the photoconductive element further comprises a binder.

9. An electrophotographic imaging apparatus comprising:

(a) a light imaging component; and

(b) an organophotoreceptor oriented to receive light from the light imaging component, the organophotoreceptor comprising an electrically conductive substrate and a photoconductive element on the electrically conductive substrate, the photoconductive element comprising:

(i) a charge transport material comprising a polymer having the formula



where X_1 and X_2 are, each independently, a linking group;

Ar comprises an aromatic group;

R_1, R_2, and R_3 comprise, each independently, H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group; and

n is a distribution of integers between 1 and 100,000 with an average value of greater than one; and

(ii) a charge generating compound.

10. An electrophotographic imaging apparatus according to claim 9 wherein R_1 and R_2 comprise, each independently, an [(N,N-disubstituted)amino]aryl group.

11. An electrophotographic imaging apparatus according to claim 9 wherein X_1 and X_2, each independently, comprise a $-(CH_2)_m-$ group, where m is an integer between 1 and 20, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a, R_b, R_c, R_d, R_e, and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, an alkynyl group, a heterocyclic group, an aromatic group, or a part of a ring group.

12. An electrophotographic imaging apparatus according to claim 11 wherein X_1 is a $-Y_4-CH_2-$ group, and X_2 is a $-Y_5-CH_2CH(Y_6H)CH_2-Y_1-Z_1-Y_2-Z_2-Y_3-CH_2CH(Y_7H)-$ group where Y_1, Y_2, Y_3, Y_4, Y_5, Y_6, and Y_7 are, each independently, O, S, or NR where R is H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group; and Z_1 and Z_2, are, each independently, an aromatic group.

13. An electrophotographic imaging apparatus according to claim 9 wherein the photoconductive element further comprises a second charge transport material.

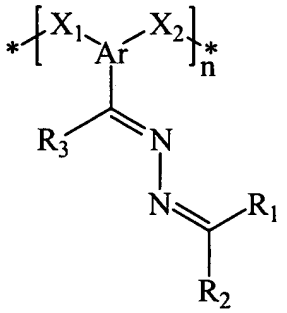
14. An electrophotographic imaging apparatus according to claim 13 wherein second charge transport material comprises an electron transport compound.

15. An electrophotographic imaging apparatus according to claim 9 further comprising a toner dispenser.

16. An electrophotographic imaging process comprising;

(a) applying an electrical charge to a surface of an organophotoreceptor comprising an electrically conductive substrate and a photoconductive element on the electrically conductive substrate, the photoconductive element comprising

(i) a charge transport material comprising a polymer having the formula



where X_1 and X_2 are, each independently, a linking group;

Ar comprises an aromatic group;

R_1, R_2, and R_3 comprise, each independently, H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group; and

n is a distribution of integers between 1 and 100,000 with an average value of greater than one; and

(ii) a charge generating compound.

(b) imagewise exposing the surface of the organophotoreceptor to radiation to dissipate charge in selected areas and thereby form a pattern of charged and uncharged areas on the surface;

(c) contacting the surface with a toner to create a toned image; and

(d) transferring the toned image to substrate.

17. An electrophotographic imaging process according to claim 16 wherein R_1 and R_2 comprise, each independently, an [(N,N-disubstituted)amino]aryl group.

18. An electrophotographic imaging process according to claim 16 wherein X_1 and X_2, each independently, comprise a $-(CH_2)_m-$ group, where m is an integer between 1 and 20, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a, R_b, R_c, R_d, R_e, and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, an alkynyl group, a heterocyclic group, an aromatic group, or a part of a ring group.

19. An electrophotographic imaging process according to claim 18 wherein X_1 is a $-Y_4-CH_2-$ group, and X_2 is a $-Y_5-CH_2CH(Y_6H)CH_2-Y_1-Z_1-Y_2-Z_2-Y_3-CH_2CH(Y_7H)-$ group where Y_1, Y_2, Y_3, Y_4, Y_5, Y_6, and Y_7 are, each independently, O, S, or NR where R is H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group; and Z_1 and Z_2, are, each independently, an aromatic group.

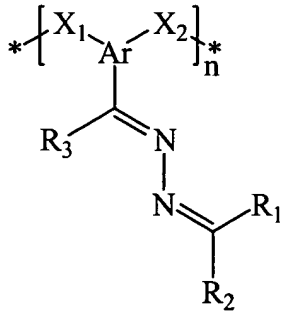
20. An electrophotographic imaging process according to claim 16 wherein the photoconductive element further comprises a second charge transport material.

21. An electrophotographic imaging process according to claim 20 wherein the second charge transport material comprises an electron transport compound.

22. An electrophotographic imaging process according to claim 16 wherein the photoconductive element further comprises a binder.

23. An electrophotographic imaging process according to claim 16 wherein the toner comprises colorant particles.

24. A charge transport material comprising a polymer having the formula



where X_1 and X_2 are, each independently, a linking group;

Ar comprises an aromatic group;

R_1, R_2, and R_3 comprise, each independently, H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group; and

n is a distribution of integers between 1 and 100,000 with an average value of greater than one.

25. A charge transport material according to claim 24 wherein R_1 and R_2 comprise, each independently, an [(N,N-disubstituted)amino]aryl group.

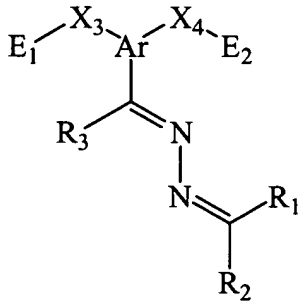
26. A charge transport material according to claim 24 wherein X_1 and X_2, each independently, comprise a $-(CH_2)_m-$ group, where m is an integer between 1 and 20, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a, R_b, R_c, R_d, R_e, and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, an alkynyl group, a heterocyclic group, an aromatic group, or a part of a ring group.

27. A charge transport material according to claim 26 wherein X_1 is a $-Y_4-CH_2-$ group, and X_2 is a $-Y_5-CH_2CH(Y_6H)CH_2-Y_1-Z_1-Y_2-Z_2-Y_3-CH_2CH(Y_7H)-$ group where Y_1, Y_2, Y_3, Y_4, Y_5, Y_6, and Y_7 are, each independently, O, S, or NR where R is H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group; and Z_1 and Z_2, are, each independently, an aromatic group.

28. A charge transport material according to claim 27 wherein Y_1, Y_2, and Y_3 are, each independently, S; and Z_1 and Z_2, are, each independently, a phenylene group

29. A charge transport material according to claim 24 wherein Ar is an aromatic C_6H_3 group.

30. A method for forming a polymeric charge transport material, the method comprising the step of co-polymerizing a bridging compound having a bridging group and at least two functional groups with a charge transport material having the formula:



where X_3 and X_4 are, each independently, a linking group;

Ar comprises an aromatic group;

R_1, R_2, and R_3 comprise, each independently, H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group; and

E_1 and E_2 are, each independently, a reactive ring group.

31. A method for forming a polymeric charge transport material according to claim 30 wherein E_1 and E_2 are, each independently, an epoxy group, a thiiranyl group, an aziridino group, or an oxetanyl group.

32. A method for forming a polymeric charge transport material according to claim 30 wherein X_3 and X_4 are, each independently, a $-(CH_2)_p-$ group, where p is an integer between 1 and 10, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, an NR_g group, a CR_h group, a CR_iR_j group, or a SiR_kR_l where R_g, R_h, R_i, R_j, R_k, and R_l are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl

group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, an alkynyl group, a heterocyclic group, an aromatic group, or a part of a ring group.

33. A method for forming a polymeric charge transport material according to claim 32 wherein X_3 and X_4, each independently, are O, S, or NR where R is H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group.

34. A method for forming a polymeric charge transport material according to claim 30 wherein the at least two functional groups, each independently, are selected from the group consisting of a hydroxyl group, a thiol group, amino groups, and a carboxyl group.

35. A method for forming a polymeric charge transport material according to claim 30 wherein the bridging group comprises a $-(CH_2)_k-$ group, where k is an integer between 1 and 30, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, an NR_m group, a CR_n group, a CR_oR_p group, or a SiR_qR_r where R_m, R_n, R_o, R_p, R_q, and R_r are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, an alkynyl group, a heterocyclic group, an aromatic group, or a part of a ring group.

36. A method for forming a polymeric charge transport material according to claim 30 wherein the bridging compound is selected from the group consisting of a diol, a dithiol, a diamine, a dicarboxlyic acid, a hydroxylamine, an amino acid, a hydroxyl acid, a thiol acid, a hydroxythiol, and a thioamine.

37. A method for forming a polymeric charge transport material according to claim 30 wherein R_1 and R_2 comprise, each independently, an [(N,N-disubstituted)amino]aryl group.